



Encoding Guideline II: Clinical Algorithm

Susana Martins, MD MSc
Samson Tu, MS
Martha Michel, PhD



Available from previous sessions

- Formal statements to be encoded
- An ATP III knowledge base with
 - Concept hierarchy
 - Expressions: presence criteria, numeric criteria, N-ary criteria...
 - Eligibility criteria, goals, and patient characterization



Goals of this session

- Describe components of clinical algorithm
- Encode a collection of recommendations as a clinical algorithm
- Execute the clinical algorithm to generate patient-specific advice



Outline

- Describe Clinical Algorithm building blocks
- Workshop Activity: create clinical algorithms and use test cases to check recommendations

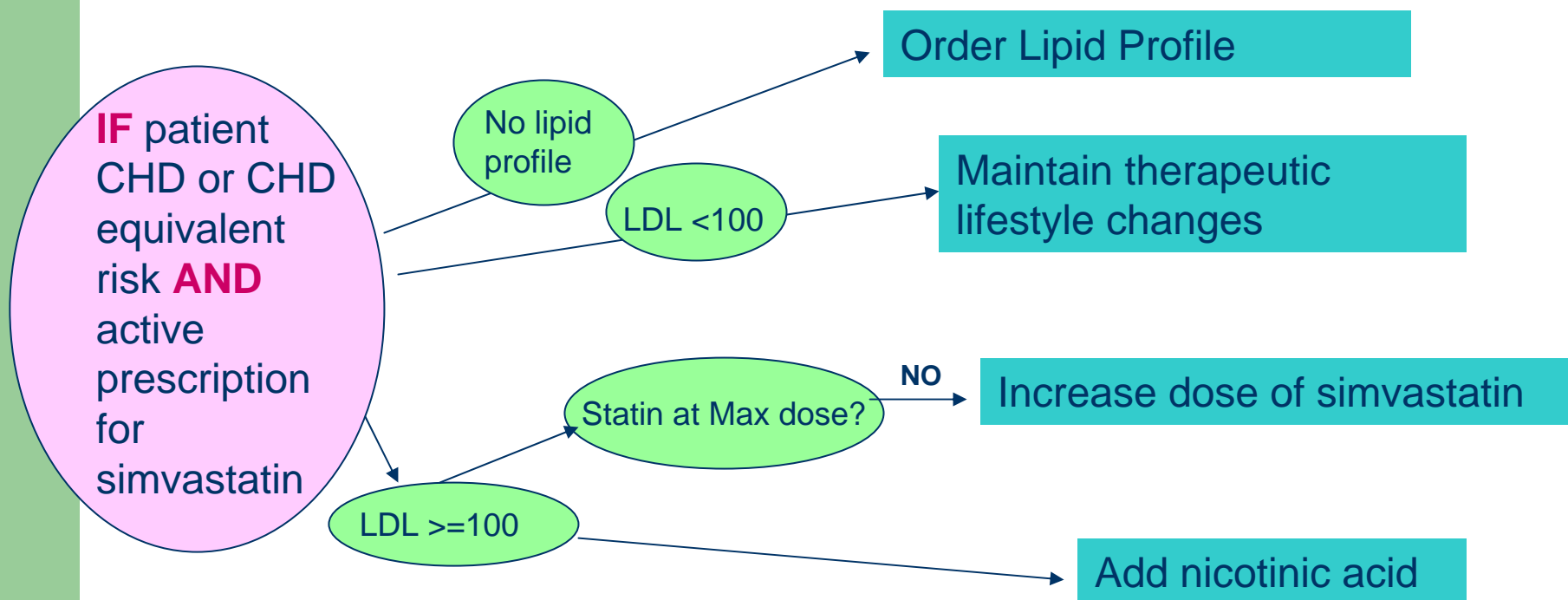


EON Clinical Algorithm

- Purpose: Generate recommendations
 - Messages
 - Drugs
 - Referrals
- Components:
 - Scenarios (starting point)
 - Decision nodes
 - Action-choice (recommendations) (endpoint)



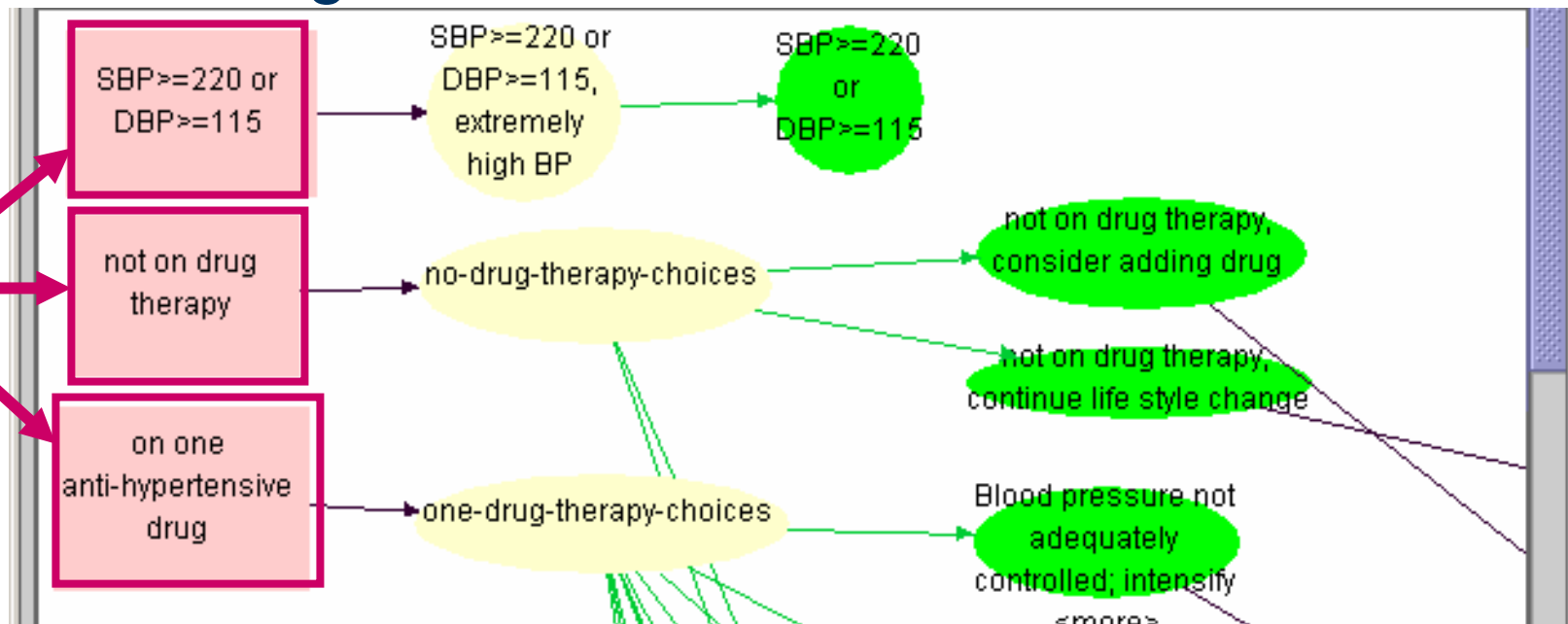
Recap: Clinical algorithm





EON Clinical Algorithm

- **Scenarios:** mutually exclusive entry points for management decisions and actions





What makes “good” scenarios?

- Key determinants of management decisions
- Unambiguous definitions with reliable data
- Manageable number of starting points
- Explainable to clinicians

ATHENA HTN:

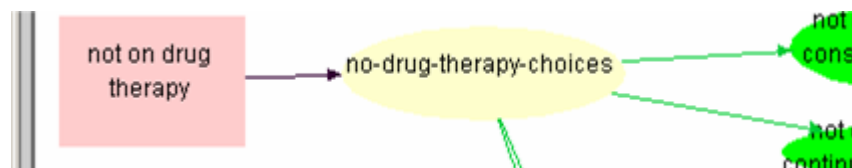
Not good: Therapeutic lifestyle change, co-morbidities

Possible: Classes of drugs, BP within/outside goal, number of drugs



Parts of a scenario

- **New encounter:** if true, evaluate scenario as a possible starting point
- **Precondition:** if evaluate to true, then use as starting point
- **Followed by:** next step in algorithm
- **Consultation Template:** scenario-specific messages



not on drug therapy (instance of Scenario, internal na...)

Label	Precondition
not on drug therapy	no drug therapy and [SBP<220 ai...

New Encounter	Reference
true	

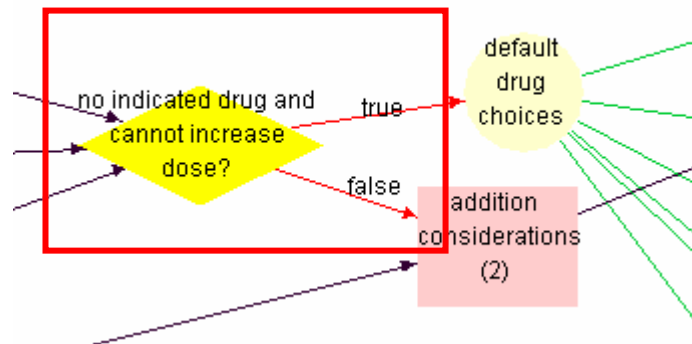
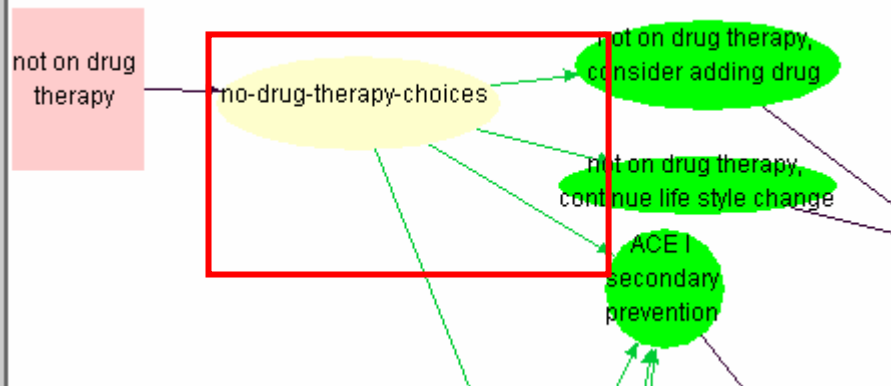
Consultation Te
not on antihypertension medicatic...

Followed By
no-drug-therapy-choices



Modeling decisions

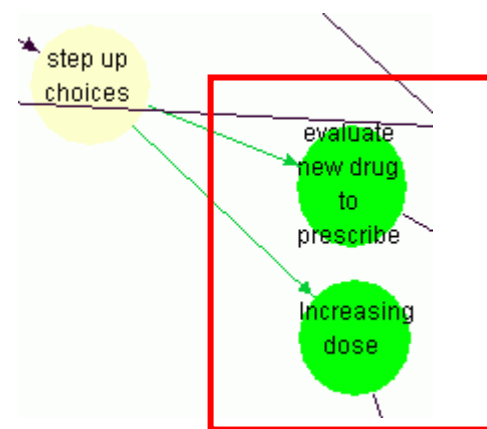
- **Choice step:** followed by action choices (possibly more than one preferred choice)
- **Case step:** evaluated expression determines which path to take





Modeling actions

- **Action choice:**
 - Rule in/out criteria
 - Define actions
 - Messages
 - Drug recommendations
 - Referrals...





Modeling preferences on actions

- **Strict Rule Out**
Condition: Evaluated first. If true, action choice is ruled out
- **Strict Rule In**
Condition: If true, action choice is preferred

not on drug therapy, consider adding drug (instance of Action_Choice, internal name is ATHENAI...

Label	Strict Rule Out Co	Actions
not on drug therapy, consider adding dri	BP adequately controlled	evaluate new drug to prescribe
		Adding drug, DBP<100 and SBP<1
		Adding drug, SBP>=160 or DBP>=
		Adding drug, marginally elevated B

Default Preferen

Followed By

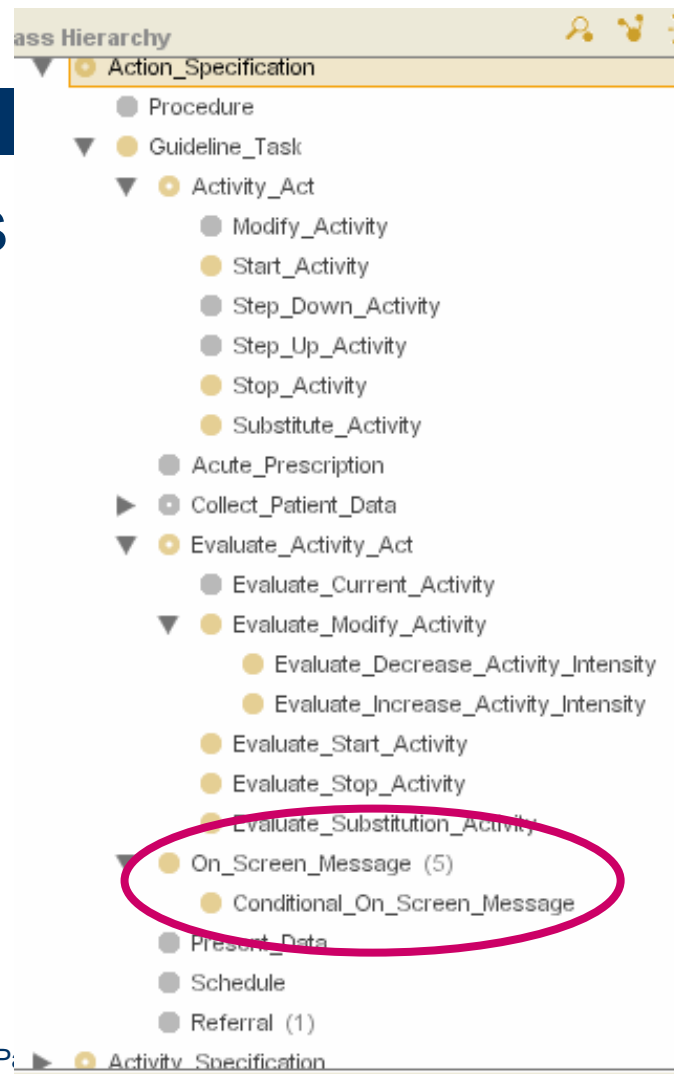
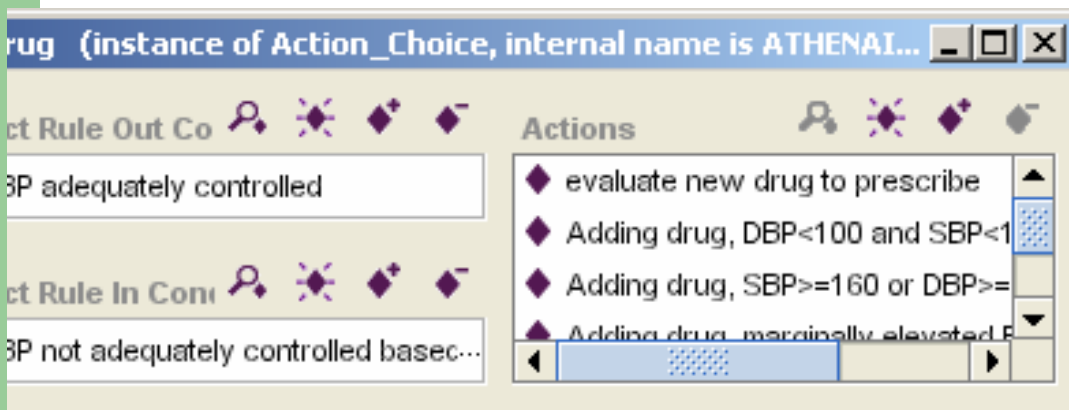
Reference

no indicated drug and cannot increi...



Modeling actions

- Action specification- specifies actions that generate recommendations
- Example: add message





EON clinical algorithm

- Minimum Requirements:
 - Patient is eligible for the guideline
 - One new-encounter scenario must be applicable to patient case



Executing KB Test Environment

Forms

Instances

Queries

EON/ATHENA Guideline Test Environment

Knowledge Tree

Classes & Instances

Instance Tree

Classes

Slots

ct Patient

Patient Data

Patient Data from:

GUI Entry

Select Patient:

John Doe

Save Patient Records

Create new patient record

Compute Recommendations

Results

Case: 1140640070569
unknown year old null null
Labs:

Lab	Value	Date
LDL	192	2006-2-16

Medications: lovastatin(7.0)
Problems:

Problem	First/Last	Class	Reported	ICD9 code
---------	------------	-------	----------	-----------

Guideline Manager Output (compliance level:



Workshop activity

- Construct clinical algorithm for Workshop Consensus (ATP III guideline)
 - Identify scenarios
 - Model decisions and actions
 - Run test patient case
- Structure: “See one, Do one together, Do one in pairs”



Brainstorming Scenarios: HINTS

- Manageable number of scenarios.
- Scenarios are mutually exclusive
- Reliable patient data
- Categorizing elements for scenarios: drug class (none, statins...), number of drugs, goal achieved?
- Create common pathways in a “simplified” way for maintenance purposes



Let's Create a Clinical Algorithm

- Patient scenario: Low Risk category on no lipid lowering drug
- Recommendations:
 - Order lipid profile
 - Encourage maintenance of therapeutic lifestyle changes
 - LDL not at goal, start therapeutic lifestyle changes
 - LDL not at goal, start lipid lowering therapy